

November 22, 2022

Full Steam Ahead – Recent Developments in U.S. Hydrogen Investments, Incentives and Policies

Recent Legislative and Executive Action in the United States, Including the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, Could Spur Growth of Clean Hydrogen as a Commercially Viable Way to Decarbonize the U.S. Economy.

SUMMARY

The United States is launching ambitious policy measures and programs, including substantial tax incentives and loan programs, aimed at supporting the growth of a cost-competitive clean hydrogen industry. The Biden-Harris administration has identified zero or low carbon hydrogen as a key element of its strategy for reaching net zero U.S. greenhouse gas emissions by no later than 2050, and 100% carbon-free electricity by 2035. The United States is already a major producer of hydrogen, much of it produced from fossil fuels. However, converting industrial operations and transportation systems to hydrogen is costly, and public sector support is crucial to enable clean hydrogen producers to design and and construct the infrastructure to compete with fossil fuel alternatives and other clean fuel resources.

Both the Inflation Reduction Act (“IRA”), signed by President Biden in August 2022, and the 2021 Infrastructure Investment and Jobs Act, more commonly known as the Bipartisan Infrastructure Law (“BIL”), contain meaningful new subsidies, tax credits, and requirements for coordinated federal policy on hydrogen intended to jumpstart an at-scale U.S. clean hydrogen industry.

BACKGROUND

Hydrogen holds particular promise as a low carbon fuel source because it can replace the fossil fuels currently used to power carbon-intensive heavy industry and transportation sectors that are difficult or

SULLIVAN & CROMWELL LLP

impossible to electrify. ‘Green’ hydrogen can be created by using renewable sources to generate the electricity used to electrolyze water, splitting off the hydrogen molecule, while ‘blue’ hydrogen is produced using fossil fuels but the emitted carbon is captured and stored. Clean hydrogen could then be shipped over long distances (potentially in the form of ammonia) for use in regions without easy or sufficient access to renewable energy sources or employed in industries or modes of transportation, such as steel manufacturing and air travel, that generate high emissions which cannot be easily reduced through green electrification.

However, not all hydrogen is clean. So-called ‘gray hydrogen’ is produced using natural gas, and ‘brown hydrogen’ is produced using coal. These are the dominant forms of hydrogen produced and used in the U.S. today. Part of the challenge for policy makers and the private sector is reducing the cost of low to zero carbon clean hydrogen to be competitive with higher-emission fuel sources, including gray and brown hydrogen.

For additional information on hydrogen, please see these additional S&C resources:

- S&C’s memo on the basics of the hydrogen market, available [here](#);
- S&C’s memo on recent developments in European Union hydrogen policy, available [here](#);
- S&C’s Critical Insights episode on government policies towards hydrogen, available [here](#);
- S&C’s Critical Insights [episode](#) and related [memo](#) on investment structuring considerations for hydrogen projects; and
- S&C’s webinar on financing hydrogen projects and related M&A and joint ventures, available [here](#).

HYDROGEN INCENTIVES IN THE INFLATION REDUCTION ACT

The IRA establishes both direct incentives and policies aimed at boosting clean hydrogen production, as well as a variety of incentives for clean energy technologies and decarbonization of industry and transport that could ultimately boost offtake demand for that newly produced clean hydrogen. For further analysis of the IRA’s tax incentives and climate-funding provisions, please see S&C’s detailed memo [here](#).

Most directly, the IRA adds a new tax credit for the production of qualified clean hydrogen. To qualify as ‘clean’, the hydrogen must be produced through a process that results in lifecycle greenhouse gas emissions (as defined in the Clean Air Act) through the point of production of no more than four kilograms of CO₂e per kilogram of hydrogen. The qualified clean hydrogen must also be produced in the United States in the ordinary course of a trade or business of the taxpayer for sale or use, for which the production and sale or use must be verified by an unrelated party. The value of the credit depends on the lifecycle greenhouse gas emissions—in effect, the cleaner the hydrogen, the greater the credit.

The amount of the base credit is equal to the amount of qualified clean hydrogen produced multiplied by \$0.60 (subject to inflation adjustments) multiplied by an applicable percentage. The applicable percentage

SULLIVAN & CROMWELL LLP

depends on the total lifecycle greenhouse gas emissions per kilogram of hydrogen, and ranges from 20 percent if the lifecycle greenhouse gas emissions are between 2.5–4 kg of CO₂e per kilogram of hydrogen to 100 percent for less than 0.45 kg of CO₂e per kilogram of hydrogen. A qualified clean hydrogen facility can receive a rate five times the base credit if the qualified clean hydrogen production facility meets certain prevailing wage and apprenticeship requirements or if construction of the facility begins before 60 days after publication of guidance on the prevailing wage and apprenticeship requirements.

The fact that clean hydrogen can qualify for the credit if it is produced for ‘sale’ or ‘use’ is significant because this flexibility allows taxpayers to claim a production tax credit (“PTC”) for producing qualified clean hydrogen even if the clean hydrogen is not sold to an unrelated party, which had previously been a requirement to claim the PTC. Qualified clean hydrogen production facilities must begin construction before January 1, 2033 and must also be owned by the taxpayer.

The IRA’s incentives could cover both green and blue hydrogen, as the IRA also provides tax incentives for carbon capture facilities. However, the structure of the tax credits favors production of green hydrogen, as hydrogen produced using renewable energy is likely to have lower lifecycle greenhouse gas emissions than blue hydrogen that relies on carbon capture technologies to reduce emissions.

Additional provisions of the IRA could indirectly boost the clean hydrogen industry by stimulating demand, which will be critical, as supply and demand for hydrogen will need to be developed in tandem. In particular, the IRA provides tax credits for producing sustainable aviation fuels, which can use hydrogen, and grants for both automotive manufacturing facilities that make clean vehicles and clean heavy-duty vehicles, which can include hydrogen fuel cell electric vehicles.¹

The IRA also includes substantial tax credits and other budgetary appropriations aimed at incentivizing production of, and investments in, renewable energy. Additional renewable energy sources could boost the clean hydrogen sector by facilitating production of green hydrogen. These IRA programs include additional funding for loans and loan guarantees for energy infrastructure and transmission projects that aim to reduce greenhouse gas emissions from the energy sectors. The IRA’s incentives also include an extension of tax credits for wind and solar projects and new direct pay provisions that create additional means for monetizing the IRA’s energy-related tax incentives.

HYDROGEN INCENTIVES IN THE BIPARTISAN INFRASTRUCTURE LAW

The BIL includes additional funding and incentives to jumpstart a domestic clean hydrogen industry, including \$9.5 billion authorized for clean hydrogen programs primarily under the auspices of the Department of Energy (“DOE”). Initiatives backed by BIL funding include:

- ***Regional Clean Hydrogen Hubs:*** The BIL allocates \$8 billion to develop [regional clean hydrogen hubs](#), which the BIL defines as networks of clean hydrogen producers, potential clean hydrogen

consumers, and connective infrastructure located in close proximity.² The law targets development of at least four hubs designed to demonstrate the range of possible development approaches, including hubs using fossil fuels, renewable energy, and nuclear energy, as well as hubs that demonstrate the possible end uses, including electric power generation, industrial uses, transportation, and heating. The DOE is aiming to develop, via its H2Hubs program, six to ten regional clean hydrogen hubs across the United States. Concept papers for development of initial hubs were due November 7, 2022, with full applications due April 7, 2023. Several states have begun organizing to participate in the program—see below for further details.

- ***Electrolysis Program:*** The BIL allocates \$1 billion to establish a program to facilitate commercial production of [clean hydrogen using electrolyzers](#).³ The goal of the program is to reduce the cost of hydrogen produced using electrolyzers to less than \$2 per kilogram of hydrogen by 2026. Electrolysis is a key technology in production of green hydrogen because it can be powered by renewable energy, but this technology is not yet cost competitive with steam methane reforming, which produces gray hydrogen from natural gas.
- ***Manufacturing and Recycling Initiatives:*** The BIL also allocates \$500 million for research and development related to clean hydrogen equipment manufacturing projects and increased reuse and recycling of clean hydrogen technologies.⁴ The BIL specifies that funding for manufacturing R&D programs should prioritize projects that increase efficiency and cost effectiveness, support domestic U.S. supply chains, or are located in economically distressed areas of the United States's major natural gas-producing regions.

The DOE issued a request for information regarding both the hydrogen electrolysis program and the hydrogen manufacturing and recycling initiatives seeking public input on priority areas that will advance domestic manufacturing and recycling of clean hydrogen technologies and electrolyzer technologies for affordable clean hydrogen production, and it has received over 120 responses that are currently under review.⁵

RECENT DEPARTMENT OF ENERGY AND STATE INITIATIVES

In addition to the federal funding allocated under the IRA and the BIL, the DOE and individual U.S. states are also taking further action to accelerate the production and use of clean hydrogen. Notable high-impact programs and measures include:

DOE's National Clean Hydrogen Strategy and Roadmap. In September 2022, the DOE published a [draft National Clean Hydrogen Strategy and Roadmap](#), fulfilling a mandate in the BIL to develop a “technologically and economically feasible national strategy” for facilitating widespread uptake of clean hydrogen. The roadmap identifies three key strategies for developing and adopting clean hydrogen as a decarbonization tool that also provides economic and social benefits for communities within the United States: (1) targeting high-impact applications for clean hydrogen where limited decarbonization alternatives exist; (2) reducing the cost of clean hydrogen; and (3) developing regional networks where production and end-users are in close proximity, and local jobs and domestic manufacturing can be developed.

DOE's Hydrogen Shot. As part of the DOE's efforts to reduce the cost of clean hydrogen, it has launched the [Hydrogen Energy Earthshot](#), also known as the Hydrogen Shot, which aims to achieve the Department's

SULLIVAN & CROMWELL LLP

“1 1 1” goal: reduce the cost of clean hydrogen to \$1 per one kilogram in one decade. Achieving that would amount to an 80 percent reduction in the cost of clean hydrogen. As part of the Hydrogen Shot initiative, the DOE has issued requests for information to elicit and identify opportunities for strategic hydrogen use across the United States.

State-Level Initiatives. Many states have also launched plans to develop hydrogen industries. Notable actions include:

- **Northeast States:** Six northeast states (New York, New Jersey, Connecticut, Massachusetts, Maine, and Rhode Island) have joined together in a consortium, led by New York, to develop a proposal to create a regional clean hydrogen hub under the BIL.⁶ The participating states have joined with over 60 public and private partners from sectors including technology, manufacturing, utilities, and education to submit a proposal for the funding being provided under the BIL to develop regional hubs.⁷ The proposed hubs would assist the six states with reaching their own climate and clean energy goals.
- **California:** California has launched its own initiative to create a regional clean hydrogen hub under the BIL.⁸ On October 6, California [announced](#) the creation of a not-for-profit public-private partnership, the Alliance for Renewable Clean Hydrogen Energy Systems (“ARCHES”), that will submit California’s single, state-wide application for federal hydrogen hub funding and work to create a renewable hydrogen market in California.

* * *

ENDNOTES

-
- ¹ Inflation Reduction Act, Pub. L. No. 117-169, sec. 13203, sec. 50142, sec. 50143, and sec. 60101.
 - ² Infrastructure Investment and Jobs Act, Pub. L. No. 117-28, sec. 40314, § 813.
 - ³ Infrastructure Investment and Jobs Act, Pub. L. No. 117-28, sec. 40314, § 816.
 - ⁴ Infrastructure Investment and Jobs Act, Pub. L. No. 117-28, sec. 40314, § 815.
 - ⁵ *Hydrogen and Fuel Cell Technologies Office Funding Opportunities*, U.S. DEP’T OF ENERGY, <https://www.energy.gov/eere/fuelcells/hydrogen-and-fuel-cell-technologies-office-funding-opportunities>.
 - ⁶ Press Release, New York State, Governor Hochul Announces Multi-State Agreement Signed with Major Hydrogen Ecosystem Partners to Propose a Regional Clean Energy Hydrogen Hub (Mar. 24, 2022), <https://www.governor.ny.gov/news/governor-hochul-announces-multi-state-agreement-signed-major-hydrogen-ecosystem-partners>.
 - ⁷ Press Release, New York State, Governor Hochul Announces Maine and Rhode Island Join Multi-State Agreement to Propose a Regional Clean Hydrogen Hub (Aug. 25, 2022), <https://www.governor.ny.gov/news/governor-hochul-announces-maine-and-rhode-island-join-multi-state-agreement-propose-regional>
 - ⁸ Press Release, California Governor’s Off. of Bus. & Econ. Dev., California Formally Announces Intention to Create a Renewable Hydrogen Hub (May 18, 2022), <https://business.ca.gov/california-formally-announces-intention-to-create-a-renewable-hydrogen-hub>.

SULLIVAN & CROMWELL LLP

ABOUT SULLIVAN & CROMWELL LLP

Sullivan & Cromwell LLP is a global law firm that advises on major domestic and cross-border M&A, finance, corporate and real estate transactions, significant litigation and corporate investigations, and complex restructuring, regulatory, tax and estate planning matters. Founded in 1879, Sullivan & Cromwell LLP has more than 900 lawyers on four continents, with four offices in the United States, including its headquarters in New York, four offices in Europe, two in Australia, and three in Asia.

CONTACTING SULLIVAN & CROMWELL LLP

This publication is provided by Sullivan & Cromwell LLP as a service to clients and colleagues. The information contained in this publication should not be construed as legal advice. Questions regarding the matters discussed in this publication may be directed to any of our lawyers or to any Sullivan & Cromwell LLP lawyer with whom you have consulted in the past on similar matters. If you have not received this publication directly from us, you may obtain a copy of any past or future publications by sending an e-mail to SCPublications@sullcrom.com.